

## WHAT IS CLAIMED IS:

1. An apparatus for modifying surface of polymer powder by rotational ultrasonic treatment, which comprises:

a hopper which feeds pulverized polymer powder;

a rotor which is linked to the bottom of the hopper as an integrated body, linked to a driving means through a power transferring means, and rotates by the power transferred from the driving means;

a rotating disk which is linked to the bottom of the rotor as an integrated body by a bolt, and is provided with a downsloped plane at the center;

a shaft which extends through centers of the hopper, the rotor, and the rotating disk, and discharges the polymer powder fed from the hopper out of the bottom of the rotating disk;

an ultrasonic vibrator which is positioned at the bottom of the rotating disk with a gap, and modifies the polymer powder fed by the shaft using ultrasonic wave;

a converting means which is linked to the bottom of the ultrasonic vibrator, and comprises a booster and a converter; and

a generator which is linked to the converting means through a cable.

2. The apparatus for modifying surface of polymer powder by rotational ultrasonic treatment according to 1, wherein there is provided a downsloped plane with a predetermined angle at the bottom of the rotating disk so that the polymer powder can be discharged easily.

3. The apparatus for modifying surface of polymer powder by rotational ultrasonic treatment according to 1, which further comprises a discharging plate that encompasses the lower gap between the rotating disk and the ultrasonic vibrator, and guides the polymer powder discharged outward.

4. The apparatus for modifying surface of polymer powder by rotational ultrasonic treatment according to 1, wherein the ultrasonic vibrator is attached to a second supporting plate which can move up and down through rails, so that the gap between the rotating disk and the ultrasonic vibrator can be controlled.

5. The apparatus for modifying surface of polymer powder by rotational ultrasonic treatment according to 1, wherein the power transferring means is a combination of a timing belt and a pulley.

6. A method of modifying for polymer powder using rotational ultrasonic treatment, wherein polymer powder is fed between a rotating disk and an ultrasonic vibrator, which are positioned with a gap, and treated with ultrasonication while being rotated, and then discharged by the centrifugal force due to the rotation of the rotating disk.

7. The method of modifying for polymer powder by rotational ultrasonic treatment according to Claim 6, the modification degree and quantity of which are controlled by controlling the rotation speed of the rotating disk and the gap between the rotating disk and the ultrasonic vibrator.

8. The method of modifying for polymer powder by rotational ultrasonic treatment according to Claim 6, wherein the polymer powder is rubber, waste rubber, waste tires, or plastic powder.